

V. Gordon Childe and the vocabulary of revolutionary change

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Because Childe wrote extensively for non-archaeologists and the public his Neolithic and Urban Revolutions have continued to influence historians in general — and historians of technology in particular — into the 1990s. This paper examines their influence, while noting significant changes in Childe's terminology and use of analogy between 1928 and 1957.

Keywords: Gordon Childe, Neolithic Revolution, Urban Revolution, technology, vocabulary

Introduction

Some publications have an extraordinary influence beyond their immediate subject area, irrespective of their changing status within academic history and archaeology, if they contain ideas or terminology that can be seized upon in general or popular books. The history of technology in particular remains in the grip of Lynn White Jr (1962: medieval inventiveness), Moses Finley (1965: classical stagnation) and V. Gordon Childe (1936/42: NR and UR¹). But while White and Finley simply defended or elaborated their initial theses in later writings, Childe's vocabulary of revolution changed in response to a broader socio-political context. Furthermore, the many writers who treat the NR and/or the UR as counterparts of the IR of the 18th century AD overlook the fact that Childe actually 'invented' these prehistoric revolutions by analogy with the IR.

In the first Gordon Childe memorial lecture in 1975 Grahame Clark implied (1976: 16) — condescendingly — that the NR and UR were of merely antiquarian interest:

At this point I ought I suppose to refer to Childe's Neolithic and Urban Revolutions which exist in our thoughts whether or not they did in prehistory . . . What prehistorians now visualise is the operation of inexorable processes.

1 The abbreviations NR (Neolithic Revolution), UR (Urban Revolution) and IR (Industrial Revolution) will be employed other than in quotations.

However, this sentiment has had little impact on the presentation of the NR in particular in general accounts of economic and/or technological history. Cipolla's *The economic history of world population* (1978) not only retained its first chapter title, 'The two revolutions' (i.e. the NR and the IR), but devoted a long footnote to Clark (1978: 34):

All definitions are *ad hoc* and their validity rests on what one wants to demonstrate. In this book I am using the term Neolithic or Agricultural Revolution not in relation to speed but in relation to the revolutionary character of a change that, no matter how rapid or how slow, transformed hunters and gatherers into shepherds and farmers.

The central interest of this aspect of Childe's work was underlined in 1980 by Trigger's choice of title for his book *Gordon Childe: revolutions in archaeology*.

Genesis of revolutions

Childe first made direct associations between the noun 'revolution' (frequently with a capital 'R') and episodes of change in prehistory in the mid 1930s. It had been notably absent from *The dawn of European civilization* (1925), which employed the language of transition (e.g. 'The several stages of the transformation of the world of food-gatherers . . . to this state of [Bronze Age] civilization', 1925: 302). The introduction to *The most ancient East* (1928) spoke of 'The

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Received 19 May 1998, accepted 24 June 1998, revised 21 July 1998.

ANTIQUITY 73 (1999): 97–109

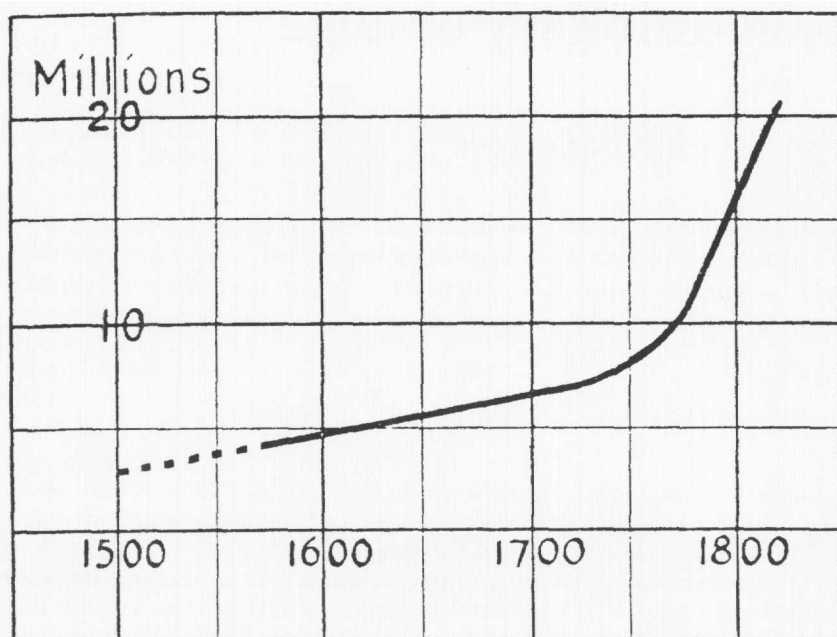


FIGURE 1. The 'gee-whiz' curve employed in (optimistic) presentations of economic data has become a familiar visual metaphor. Childe's 'Graph of the estimated population of Great Britain, 1500-1800' was one of the few illustrations in *Man makes himself* (1936: 15, figure 1). It supports his use of the IR to establish an association between past revolutions and demographic expansion.

greatest moments — that revolution whereby man ceased to be purely parasitic . . . and then the discovery of metal and the realization of its properties — have indeed been passed before the curtain rises' (1928: 2); later in the text is found 'For now we are on the brink of the great revolution, and soon we shall encounter men who are masters of their own food supply . . .' (1928: 42). This usage parallels drafts of a contribution to Bernal's projected *Marxist history of science* that Childe wrote in 1933-4 (Gathercole 1994: 33).

New light on the most ancient East (1934) included 'revolutions, economic' as a new headword in its index, and its concluding chapter was pervaded by revolutionary vocabulary (1934: 283):

Two great revolutions in human culture fell within the scope of this book — the change from a food-gathering to a food-producing economy and the establishment of urban civilization based upon industry and commerce.

New light also added analogies with the IR of the 18th century AD. Food production '... was an economic revolution — the greatest in human history after the mastery of fire. . . Judging by the observed effects of the Industrial Revolution in England, a rapid increase of population would be the normal corollary of such a

change' (1934: 42); Sumerian towns grew into 'regular industrial and commercial cities wherein doubtless in response to the opportunities of livelihood created by the new economy an industrial proletariat multiplied as quickly as it did in England during the industrial revolution' (1934: 186); and 'As in the Industrial Revolution of Britain' this led to emigration — thereby assisting the process of diffusion (1934: 284-5).

Childe's presidential address to the Prehistoric Society in 1935 explicitly named 'the neolithic revolution' (1935: 7, 12), along with 'an economic revolution' in the Bronze Age (1935: 7, 8 — *not yet 'urban'*). 'I would suggest that the classification Old Stone Age, New Stone Age, Bronze Age and Iron Age draws attention to real revolutions that affected all departments of human life' (1935: 7), he proposed, but an 'Iron Age revolution' (1935: 8) was never employed again (McNairn 1980: 91). The NR and UR emerged fully-fledged in *Man makes himself* (1936), where they were also used as chapter headings, and were consolidated in *What happened in history* (1942). These books reflected the earnest desire of the Left in the 1930s to engage in scientific progress towards socialism (Gathercole 1994: 33-8). The IR offered an object-lesson in how science might enhance economic development, while awareness of its

negative social aspects might allow them to be planned out of existence — as seemed to be happening in the Soviet Union, which Childe visited in 1935.

The IR cropped up in many contexts in *Man makes himself* (e.g. 1936: 10, 14–16, 118, 190) (FIGURE 1) in support of Childe's claims for the fundamental nature of his own Revolutions, particularly where population growth was concerned (1936: 16):

... we shall be able to discern in earlier ages of human history other 'revolutions'. They manifest themselves in the same way as the 'Industrial Revolution' — in an upward kink in the population curve. ... It is hoped that a consideration of revolutions, so remote that it is impossible to get angry or enthusiastic about them, may help to vindicate the idea of progress against sentimentalists and mystics.

Childe restated the analogy between the IR and his UR in 1950 in an article on town-planning, and explained in detail in 'Retrospect' (1958a: 71) that it had struck him on visiting sites in the Near East and India where the UR had taken place (my emphasis):

I saw how the beginnings of literacy in the three great river valleys coincided with the erection of the first monumental tombs and temples and the aggregation of population in regular cities. Indeed at Ur and Erech I saw how rustic villages had grown into vast townships *just as English villages had grown into manufacturing towns. Now the latter transfiguration was familiarly attributed to an 'industrial revolution'*. Demographically the birth of literacy in the Ancient East also corresponded to a revolution, the Urban Revolution. The upward kink in the population graph, deduced from the monuments, must be due at least partly to the emergence in addition to the farmers of a new order of professionals who did not grow or catch their own food. ... But if the Urban Revolution had added an order of professionals to the farmers, the latter were themselves the offspring of a revolution. The adoption of food-production must have been, and, from the available data, had been, followed by a still greater expansion of population that *on the foregoing analogy* would amply justify the term 'Neolithic Revolution'.

It is important to observe the sequence: Childe initially applied the analogy of the IR to the UR, and then extended it back to the NR. Since this second step was rarely made explicit in his writing, most secondary sources simply cite him as an authority for equating the NR *directly* with the IR.

The etymology of revolution

Trigger (1980: 71, 74–5) and McNairn (1980: 91) noted Childe's IR analogy, but neither they nor subsequent commentators placed it into a broader context of the etymology of revolution, or pursued its effects in secondary (non-archaeological) literature. The pairing of the words 'Industrial' and 'Revolution' is so familiar to modern ears that its novelty is easily overlooked. The even more recent 'invention' (in linguistic terms) of the 17th-century Scientific Revolution by historians in the 1930s (Cohen 1994: 21) has enhanced its familiarity, while similar designations of political movements in the 1960s such as Mao's Cultural Revolution consolidated such usage. Archaeologists have added the 'broad spectrum' revolution (Flannery 1969), the Secondary Products Revolution (Sherratt 1981) and the Human Revolution (Collins 1976; Mellars & Stringer 1989). However much their originators (like Childe before them) stress that these 'revolutions' were processes rather than events, such vocabulary can easily acquire a life of its own (Sherratt 1997a: 156–7; 'The rhetorical flourish of an ugly title was a necessary strategy to ensure the visibility of the concept'). Coleman had already lamented (1956: 19) that 'today we have too many industrial revolutions and too many ways of discovering them', but economic historians continue to debate whether we are now engaged in a second or third IR (Pollard 1992: 48).

'Industrial Revolution' was introduced into popular usage in lectures by Arnold Toynbee (1852–83), published posthumously in 1884 (Ashton 1969). Whether or not Toynbee was his direct inspiration, Childe seems to have added resonances to the word 'revolution' derived from Engels, whose *Die Lage der arbeitenden Klasse in England* (1845) spoke of a dramatic *industrielle Revolution*, accurately reflected in English translations (1887/1892: 41, 55) but lacking the force of Toynbee's two upper-case initial letters. This form of words had emerged in northwestern Europe in the early 19th century, through the extension of the political aspects of the French Revolution of 1789 to economics (Bezanson 1922; Cohen 1985: 265). 'Revolution' had not yet gained a clear political meaning before the late 18th century, since it was still intimately associated with notions of rotation and return, rather than directional change. The 'Glorious Revolution' of 1688 —

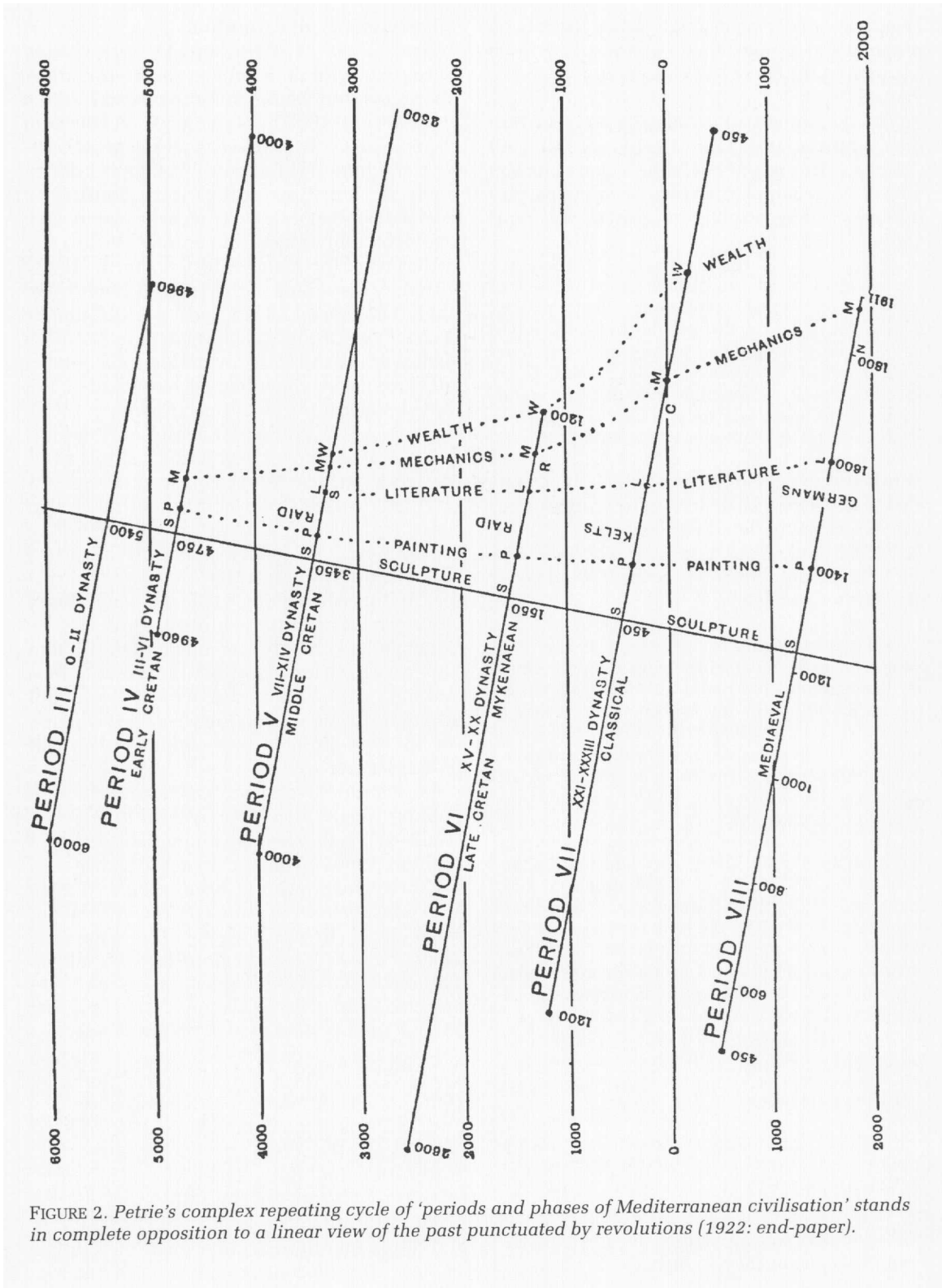


FIGURE 2. Petrie's complex repeating cycle of 'periods and phases of Mediterranean civilisation' stands in complete opposition to a linear view of the past punctuated by revolutions (1922: end-paper).

the first political event to be accorded this word by contemporaries — 'was conducted with strict attention to ancient formalities' (Macaulay 1849: II: 666), and its outcome 'a new-old form of Government' (Trevelyan 1938: 10); Marx considered it a mere *coup-d'état* (Speck 1988: 242).

W. Flinders Petrie's curious book *The revolutions of civilisation* shows that a cyclical understanding still existed in archaeological circles in the early 20th century. It went through three editions from 1911 to 1922, and proposed (1922: 5):

From what we know, it is evident . . . that civilisation is an intermittent phenomenon . . . As such it should be examined like any other action of Nature; its recurrences should be studied, and all the principles which underlie its variations should be defined.

He presented his analysis in graphic form (FIGURE 2), and explored (but rejected) a climatic origin for cyclical change, preferring a theory of racial mixture through invasion and migration (1922: 126–9). The cyclical usage also survived in the history of art; Jackson's study of Renaissance architecture (1921: 24–5) observed that

this reversion to the style of ancient Rome . . . was a revolution in Art without precedent. . . the very principles had long been forgotten, and had to be recovered slowly and with difficulty.

The Russian Revolutions of 1917 consolidated the meaning of 'revolution' (in its 1789 political sense) and confirmed its association with Marxism. Childe's terminology in the 1930s seems to derive a feeling of inevitability from Marx/Engels, while taking from Toynbee a sense of 'event' more accessible to Childe's readers (academic and popular). This combination of meanings parallels the event-like Scientific Revolution defined by Koyré in 1939 (Porter & Teich 1986: 294), and may explain the impact of the NR on readers who approached Childe's work from a scientific, social or historical (rather than archaeological) point of view. His friend and admirer J.D. Bernal followed Childe's terminology closely in *The social function of science* (1939: 14–15), and even proposed a Pneumatic Revolution in the chemical industry (1939: 27); this book also epitomized the 1930s (1939: 2):

With what appears to be a strange coincidence, the disturbing events of the Great War, the Russian revolution, the economic crisis, the rise of Fascism, and the preparation for newer and more terrible wars have been paralleled inside the field of science by the greatest changes in theory and in general outlook that it has undergone in the past three centuries.

Little wonder that Haldane, Hogben, Levy and Needham shared the sense of urgency and relevance that characterizes Childe's work in this period (Gathercole 1994: 33–4; Werskey 1978).

Toynbee's seminal publication of 1884 also discussed an Agrarian Revolution that *accompanied* the IR (rather than preceding or following it, as some subsequent writers argued: Overton 1996: 1–9). Why then did Childe not simply modify Toynbee's 'agrarian' into a term ('farming'? 'food-producing'?) similar to 'urban' and 'industrial'? Perhaps 'Neolithic' already possessed a sufficient notion of change; Ault's *Life in ancient Britain* (1920) ended a chapter on the Mesolithic with a firmly gradualist sentiment: 'And thus this dark transitional period of struggle and trial melts insensibly into the pastoral and agricultural "civilisation of the Neolithic Age"' (1920: 55). The addition of 'Revolution' in its full 20th-century sense transformed this sense of transition into one of innovation. Toynbee had also noted the *simultaneity* of rapid demographic expansion with the Industrial and Agrarian Revolutions (87–9). This idea was of crucial importance to Childe's arguments, and was illustrated by a graph of Britain's population from AD 1500–1850 in *Man makes himself* (1936: 15) (FIGURE 1). He went beyond Toynbee both in seeing this growth as 'the normal corollary' of industrial revolution (*New light*: 42), and in separating his two Revolutions so that the NR acted as provider of the increased population required for the UR (e.g. *What happened*: 59).

Revolutions in the history of technology

Insight into Childe's influence can be gained by looking at the treatment of archaeological periods by historians of technology. An inauspicious starting-point is the apparently authoritative Routledge *Encyclopaedia of the history of technology* (McNeil 1990). It includes barbed comments about archaeologists' lack of inter-

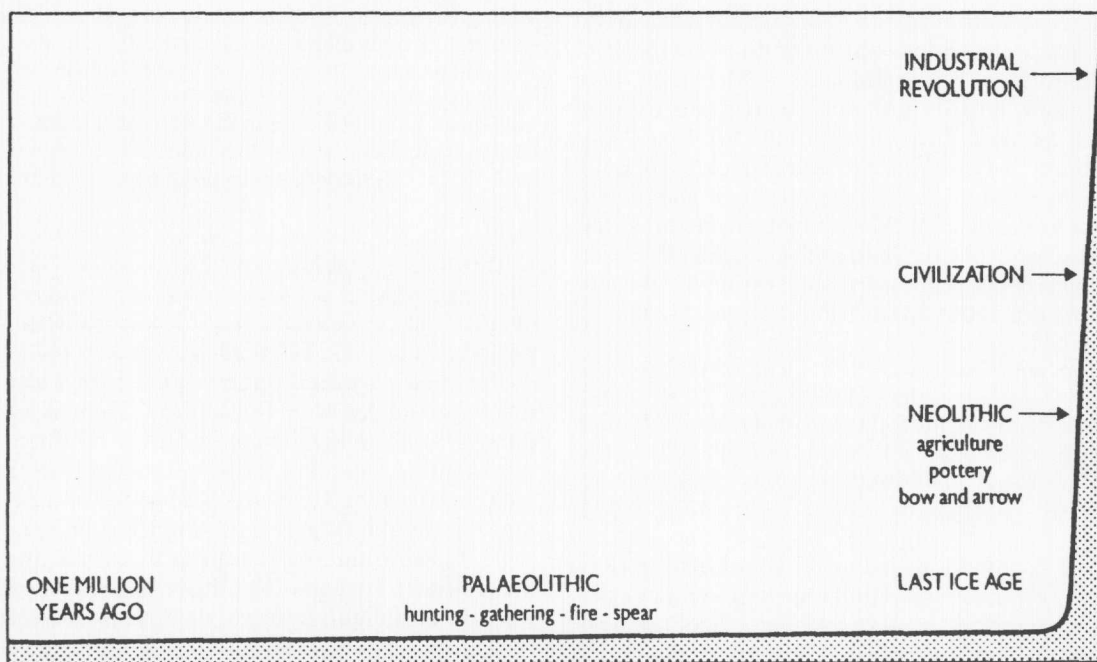


FIGURE 3. The form of graphs such as FIGURE 1 is sometimes adopted for presenting non-numeric information. In Buchanan's diagram of 'Technological development over one million years' (1992: 9, figure 2), the IR was clearly the last of three key events, preceded by 'Neolithic' and 'Civilization', in a linear sequence that had undergone a sudden directional shift after a long period of stability.

est in technology but devotes a paragraph of praise to Childe (1990: 5), who 'was convinced that we should look upon pre-history primarily as a history of technology', but included neither the NR or UR, just an 'Agrarian revolution' (along with the beginning of towns) as a characteristic of the Neolithic (1990: 6; table 1).

R.A. Buchanan's thoughtful monograph *The power of the machine* (1992) shares McNeil's rather dismissive opinion of archaeology, although it is 'particularly important for those periods of human history to which the misnomer "prehistory" has been traditionally applied' (1992: 6) (FIGURE 3). Its title reflects a 'Whiggish' sense of unstoppable (Western) progress (1992: 40), but a whole chapter is devoted to the process of technological revolution (1992: 21–40). Buchanan shows typical selectivity in his use of Childe's revolutions, however. He cites *What happened in history* as 'a classic' and 'still a stimulating read', and attaches great importance to the NR, which 'deserves to be compared with other social revolutions' (1992: 9), but (like the majority of historians of technology) makes no reference to an UR.

Trevor Williams was a young member of the team that oversaw the Oxford *History of technology* (Singer *et al.* 1954–8, to which Childe contributed); his 1987 book *The triumph of invention: from stone axe to silicon chips* has a particularly bullish title. He used the terms 'Agricultural Revolution' and 'Neolithic Revolution' to describe a single phenomenon, but preferred to call it a transition, 'for the term "revolution" suggests a rate of change which in reality never occurred' (1987: 16–17). It is common for writers to hedge 'revolution' around with caveats (as Childe himself did) but to retain his terminology and sense of directional shift.

Enthusiasm for Childe's revolutions is apparent in many non-British works. The German *Propyläen Technikgeschichte* volume 1 (Hägerman & Schneider 1990), although only beginning in detail at 750 BC, cites the profound change of the NR described by Childe, although down-playing its speed (1990: 34–5), while its analogy with the IR is supported by reference to Cipolla (1990: 35–6). An earlier (East) German book, *Geschichte der Technik* (Brentjes & Richter 1978), had made a similar allusion in

	PRODUCTION	COERCION	COGNITION	
Hunting/ gathering				> Neolithic revolution
Agraria				
Industria				> Industrial revolution

FIGURE 4. Gellner's non-chronological, non-linear matrix (1988: 21) provides an interesting conceptual alternative to FIGURE 3. The NR, UR and IR recall intellectual 'trinitarianisms' he had identified in the work of Hegel, Frazer, Marx and Polanyi (1988: 19). The 'trinities' defined in his Plough, sword and book involved 'the transformation and interrelation of production, coercion and cognition. We shall follow them through the three stages, with all their internal varieties, and across the two great leaps' (1988: 21).

(Ernest Gellner: diagram taken from *Plough, sword and book*, at page 21. First published in *Great Britain* by Harvill 1988. © Ernest Gellner 1988. Reproduced by permission of the Harvill Press.)

a chapter headed 'Die Agrarrevolution' (1978: 22), which the authors compared in depth and significance to the IR (understandably linked to the views of Engels: 1978: 207), and described it as 'ein historischer Prozess'. They preferred to call the period of the UR 'grosse Kooperation', however, implying cohesion rather than the increased social stratification claimed by Childe.

Two Italian surveys of technology have a Childean flavour. Forti (1963) has a heading, 'Penelope dell'età neolitica: grandi rivoluzioni tecniche e agricole . . .' (1963: 20), and another 'La prima rivoluzione industriale' (at c. 3000 BC: 1963: 26). Mondini (1973) quoted an Italian translation of *What happened*, and praised its author (1973: 114):

Non a torto il famoso studioso di preistoria Gordon Childe parla di 'rivoluzione neolitica'. È, prima della rivoluzione industriale del secolo XVIII, la più grande rivoluzione tecnica avvenuta durante il cammino dell'umanità.

Mondini resembles other authors in ignoring the UR. French-language writers also demonstrate the wide frequency of revolutionary views of technological history; Destrée's *Histoire des techniques* (1980) — a thematic rather than a chronological survey — refers to humanity's 'deux révolutions essentielles: l'une à partir de 7000 ACN, la révolution agricole; l'autre entre 1750 et 1850, la révolution industrielle' (1980: 41), their distinguishing characteristics being a reliance on slave/animal and steam power respectively. Amouretti & Comet's concise survey *Hommes et techniques* cites Childe, and poses a rhetorical question as a sub-heading — 'Peut-

on parler d'une révolution néolithique?' — to introduce the changes of that period (1993: 8).

Thus commentators of several nationalities make a clear link between the concepts of the Neolithic (Agricultural) Revolution and the IR of the 18th century AD and many cite Childe directly or indirectly. The UR has had less impact, despite the potential for relating Childe's IR analogy to Engels' observation of English towns in the early 19th century, and despite the importance of metallurgical and transport technology in both revolutions. Some writers actually create a circular argument by citing a Neolithic agricultural revolution in support of their perception of the nature of the modern IR (e.g. Cipolla 1978; Gies 1994: 14). As noted above, this misunderstands Childe's full analogy, in which the NR was the engine of change which provided sufficient food and people to bring about the 'second revolution' (the UR) that he had originally compared with the IR.

Technological history without revolutions

Lewis Mumford's *Technics and civilization* expressed a gradual view resembling Ault's 'dark transitional period' (1934: 429):

Dynamic equilibrium, not indefinite progress, is the mark of the opening age: balance, not rapid one-sided advance: conservation, not reckless pillage. The parallel between the neolithic and neotechnic times holds even here: for the main advances which were consolidated in neolithic times remained stable, with minor variations in pattern, for between 2500 and 3500 years.

Mumford's pseudo-archaeological stadial vocabulary for phases of human development and

mechanization was borrowed from Patrick Geddes, but added an 'eotechnic' to the 'paleotechnic' and 'neotechnic' phases (1934: 109–51). These were associated with technologies of water and wood, coal and iron, electricity and alloys respectively. Since Mumford's scheme lacked a pre-eotechnic phase, he could scarcely consider prehistory and early history as anything other than an amorphous block of time without revolutions. These he reserved for the recent past (1934: 151):

By the middle of the eighteenth century the fundamental industrial revolution had been accomplished: the external forces of nature were harnessed and the mills and looms and spindles were working busily through Western Europe. . . . after 1750 industry passed into a new phase, with a different source of power, different materials, and different social objectives. This second revolution multiplied, vulgarized and spread the methods and goods produced by the first.

Did Mumford's sequential revolutions help to move Childe away from Toynbee's view of simultaneity?

Three decades later, Mumford's *The myth of the machine* (1966) included a wide range of sources — anthropological, psychological, linguistic, symbolic — but deliberately avoided Childean terminology. *Social evolution* receives the comment 'as late as this Childe still clung to Lewis Morgan's stages', while *What happened in history* is 'only slightly biased by his original Marxist slant' (1966: 300). Childe's contributions to the Oxford *History of technology* (which, as we shall see below, minimized revolutionary terminology) are described as 'excellent', however (1966: 318). Mumford commented that 'V. Gordon Childe even introduced the dubious notion of the "Urban Revolution" as the culminating stage of the previous "Agricultural Revolution"' (1966: 163). The concept of revolution does not appear in the index, and the IR is not even discussed; its index entry is qualified by 'so-called', and merely refers to a 16th-century engraving of mining. One analogy about the Neolithic period does demonstrate awareness of Childe, however: 'The new flood of energy from food, which rivalled that from coal and petroleum in the nineteenth century, provided both the groundwork and the incentive for a new kind of political society' (1966: 165).

Oswald Spengler was another spirited author active during Childe's transition to fully

revolutionary vocabulary in the early 1930s — although Mumford (1934: 470) dismissed his *Man and technics* (1932) as 'heavily burdened by a rancid mysticism'. Spengler's view of history invoked cyclical change, regarding slow evolution as 'truly appropriate to the English nature, but it does not represent Nature' (1932: 36). He dismissed archaeology impatiently, but nevertheless distinguished between an 'age of the armed hand' and a 'second epoch' that caused 'the things that lie in our museums to suddenly begin to look different' (1932: 49). These changes equated to the Neolithic, but 'What changed was, not equipment, but Man. Once more it is only from his soul that man's history can be discovered' (1932: 50). Spengler drew only negative conclusions from this study, while Mumford held out Utopian hopes for the neotechnic age that was just beginning in the 1930s. Viewed from the 1990s, Childe's abandonment of racially-centred explanation (1935: 3–4) in favour of a Marxist use of archaeology as a tool for the elucidation of social evolution gives his writings an enduring rational appeal, while Spengler and Mumford now seem archaic, idealistic or downright dangerous.

Continuity rather than revolutionary change is a common thread amongst many general writers of high reputation who turned their attentions to archaeology or the history of technology before and after Childe. H.G. Wells' popular *Outline of history* (1919–20) covered prehistory in some detail. He described the features of the Neolithic 'phase' — the axe, agriculture, pottery/cooking, domesticated animals, plaiting and weaving — and added (1919–20: 62):

The Neolithic men of Europe were white men ancestral to the modern Europeans . . . there is no real break in culture from their time forward until we reach the age of coal, steam, and power-driven machinery that began in the eighteenth century.

In the early 1960s Umberto Eco was associated with a glossy *Pictorial history of inventions* (with Zarzoli, 1962). Its first page featured a drawing of a stone being broken by hand, next to an engraving of a steam-powered hammer (dated 1876 on its manufacturer's plate):

By knocking one stone against another, prehistoric man invented the first tool. He laid the foundations of technique and originated the principles governing fundamental operations. Below, an eighteenth

century (*sic*) power hammer which reproduces a primitive instinct in an enormously advanced form. All the tools we use today are based on things made in the dawn of prehistory.

This is strangely reminiscent of Childe's preface to the first edition of *The dawn* (1925: xv):

Progress is an indivisible whole in which the invention of a new way of hafting an axe formed a necessary prelude to the invention of the steam-engine or the aeroplane.

Other writers simply omit discussion of the nature of change in prehistory; Cardwell's *Fontana history of technology* (1994) disposes of everything before the Greeks in a six-page 'survey of early technics' (1994: 13–19): 'For many millennia during the Palaeolithic, or old stone age, and during the shorter Neolithic, or new stone age, progress must have been slow and for long periods, no doubt, barely recognizable to the modern student' (1994: 13). This attitude is more understandable in specifically classical or medieval studies, but is odd in contributors to Kranzberg & Pursell's primer for the US armed forces, *Technology in western civilization* (1967). This has a thorough account of prehistory and early civilizations by R.J. Forbes, who speaks of 'revolutionary changes . . . in man's technology and hence his society' at the 'dawn of history' (1967: 24), but A.G. Drachmann's subsequent chapter on classical civilizations ignores them: 'The culture of the Western world is built on a double foundation: the Christian religious tradition and the Greco-Roman civilization of Classical antiquity' (1967: 67).

Different revolutions

Some writers ignore or understate the NR (or an equivalent Agrarian/Agricultural Revolution) but make use of the UR (e.g. Forbes 1967: 22; Armytage 1961: 17; Adams 1996: 37–8), even though in one recent case it was transferred to the Iron Age (Pounds 1989: 54). Others introduce different or additional critical moments, frequently related to metal-working — a notion current in the classical world, and embodied in the Three Age System. Lewis Morgan (1878: 43) defined one such moment forcefully:

The production of iron was the event of events in human experience, without a parallel, and without an equal, beside which all other inventions and discoveries were inconsiderable, or at least subordinate.

Buchanan accepted the NR, but saw a critical shift around AD 1500 (resembling the transition from stone-working to metallurgy) from the Old Iron Age to the New Iron Age, when direct production of cast iron enhanced previously indirect production (1992: 16). This recalls Feldhaus' (1931) division of the period before the rise of civilizations into equivalents of the Stone, Bronze and Iron Ages on the basis of processes instead of materials: *Steinzeit*, *Gusszeit* and *Schmiedezeit*. Feldhaus' approach was more ethnographic than archaeological, and lacked key stages defined by revolutions, agriculture or urbanism. Several other writers have moved 'existing' revolutions to new locations (Coleman 1956); for example Jean Gimpel (1976) extended Lynn White Jr's optimistic views and proposed agricultural and industrial revolutions in the 12th/13th centuries AD.

Revolutions multiplied

The apogee of Childe's revolutionary and modernizing vocabulary came in popular writings for a serious audience, such as *Prehistoric communities of the British Isles* (1940) or his book-length section of *The European inheritance* (Barker *et al.* 1954), conceived in the early 1940s; his embarrassment at the latter (Trigger 1980: 156) implies that it was written well before publication. *Prehistoric communities* has the NR as a chapter heading (1940: 31), and 'another' or 'second' revolution in the Orient by 3000 BC culminating in 'populous and wealthy cities' (1940: 32), without invoking the IR. Surprisingly this appeared in a sub-heading — 'The Industrial Revolution of the Late Bronze Age' (1940: 168) — in chapter 9, harking back to his earliest revolutionary views (McNairn 1980: 91). This chapter is full of modern terminology — 'sales department', 'organizational machinery' (1940: 174), 'contraction of the market', 'unemployment' (1940: 180). Bernal used similar modernisms; his Mesopotamian 'business man and his clerks' used 'all modern forms of trade — credit, bills of exchange, loans, interest' (1939: 14); Finley called such usage in Rostovtzeff's *Social and economic history of the Roman Empire* (1926) 'an anachronistic burlesque of the affluent society' (1965: 42).

The revolutionary concept was stretched too far in chapter 10 of *Prehistoric communities*, 'The Agricultural Revolution': 'It was not the abortive industrial revolution of the Late Bronze

Age but an agricultural revolution during that period that actually provided sustenance for a vastly increased population' (1940: 187). The neat logic of NR leading to UR in the Near East has turned into an untidy sequence of neolithic, (abortive) industrial, and agricultural revolutions which did not fit well with evidence for population growth (Childe brought in immigrants at every point of change). Chapter 4 of *The European inheritance* (1954), 'The Neolithic Revolution', reasserts that 'This is termed a revolution in the first instance because, like the Industrial Revolution of the eighteenth century, it was followed by a quite rapid increase in the population' (1954: 39), but the analogy could not be extended to the UR, which is absent from this work. Complexity increases in chapter 15, titled 'The Industrial and Agricultural Revolution in Temperate Europe of the Late Bronze Age', which 'witnessed the completion of a revolution — industrial, economic, social, and religious' (1954: 141); then, 'An agricultural revolution was perhaps a consequence of the metallurgical' (1954: 143). There is no trace here of Toynbee's simultaneous developments in industry, agriculture and demography (1884).

Revolutions minimized

Childe used alternatives to this confused picture in the mid-1940s and early 1950s, especially when writing for the public rather than archaeologists ('more divorced from each other in his lifetime perhaps than they are today' — Gathercole 1994: 45). *The story of tools* (1944a), written for the Young Communist League, has frequent references to Morgan's and Engels' stages but no NR or UR. It echoes his Huxley Memorial Lecture 'Archaeological Ages as technological Stages' (1944b), which was profusely illustrated with tools and workshop scenes. A lack of revolutionary vocabulary also characterized Childe's contributions to two magisterial works — the *Cambridge economic history* (Postan & Rich 1952) and the *Oxford History of technology* (Singer *et al.* 1954). In *CEH* Childe traversed the Stone Stage without a NR, and discussed the Early Bronze Stage without an UR (1952: 1–5), although the words 'revolutionary' and 'revolutionise' were used (1952: 19) much as they had been in the 1920s. There is more modernizing vocabulary — 'a village smithy could easily grow into something like

a factory producing for a distant market' (1952: 20) — but when ascribing increased food production in the Iron Age to the use of iron tools, leading to greater population density and supporting new classes of specialized craftsmen, Childe did not mention the IR (1952: 29).

In the late 1940s Charles Singer, *doyen* historian of science and medicine, began to direct the first comprehensive survey in English of *The history of technology* (1954–8). Childe's keynote chapter on 'Early forms of society' (1954: 1: 38–57) included a sub-section 'The Neolithic economy' (1954: 1: 43):

Barbarism or food-production . . . initiated the Neolithic stage. Its beginning is often called the Neolithic revolution, using the term by analogy with the industrial revolution, for there are reasons for supposing that it was followed by a somewhat comparable relative increase in population.

He did not indicate that the designation of the NR had been his own idea, nor explain that the analogy with the IR had originally arisen in connection with the UR. The UR provided the next sub-section heading but was presented with a very low profile (1954: 1: 45):

This revolution did not render farming obsolete, in the way that the Neolithic revolution had superseded hunting and collecting. It should perhaps not be termed a revolution at all

— and it was not mentioned again by name. Its key aspect — the concentration of an expanded population that allowed the support of specialist craftsmen — was mysteriously described as a 'third revolution' (1954: 1: 46), while its final appearance was as an 'economic revolution' achieved in Mesopotamia, Egypt and India between 3500 and 2500 BC (1954: 1: 50). Derry & Williams maintained this understated presentation in their single-volume summary of *A history of technology* by referring only to a 'so-called Neolithic revolution' (1960: 5) and eliminating the UR altogether.

The origin of Childe's more cautious presentation of revolutions is perhaps explained in *History* (1947), a short Collingwood-like theoretical tract in which he selected technology as 'an example of an historical order' (1947: 6). 'Prehistorians call this step the neolithic revolution; stock breeding and plant cultivation are taken to mark the New or Neolithic

Stage of the Stone Stage or Age' (1947: 7); there is no reference to urban settlement (let alone revolution) in the discussion of the Bronze Stage. Marx, Engels, Lenin and even Stalin are cited in support of Dialectical Materialism, which is contrasted with the cyclical and comparative approaches of Spengler and A.J. Toynbee (1947: 64). Childe also rejected 'naturalistic theories of historical order' (1947: 43), including the Political Economy of Adam Smith and his successors derived from the IR (1947: 59):

It would be a manifest absurdity to apply deductions from such technological and sociological assumptions to, say, the early Middle Ages when land transport was confined to pack-horses and peasants were tied to the soil.

The implications for his own work of the 1930s were serious, and he had already stated (1947: 46) that

The rise and fall of Empires — Assyria, Babylon, Persia, Rome — Spain, France, Britain — have offered enticing fields for analogy-hunters. . . . But as soon as the historian extends his survey to embrace science, technology and even those aspects of strategy that are directly dependent upon technology the superficiality of analogies between several periods of man's history is laid bare.

The IR is only mentioned in non-archaeological contexts in *History* — along with the Glorious Revolution and the French Revolution (e.g. 1947: 21, 31) — reminding us that Childe's wider intellectual environment included Marxist historians as well as scientists (Gathercole 1994: 40–41).

Revolutions revived

The dawn of European civilization (1957 edition), aimed at serious archaeological readers, and *The prehistory of European society* (1958b), written for a wider public, brought the UR and NR back into favour and restated the IR analogy. The explanation lies in the focus on European distinctiveness that had returned to his work (Gathercole 1971; Trigger 1980: 158). The two prehistoric Revolutions were mentioned most explicitly in *The dawn's* final chapter (also called 'The prehistory of European society'), while the implications of the UR were stated in its final sentence: 'Craftsmen at least were not depressed into a class of slaves or serfs',

when compared to the East (1957: 345). *The prehistory of European society* was more overt, naming chapters after the NR and UR, and stating that: 'The central object of this book is to show that even in prehistoric times barbarian societies in Europe behaved in a distinctly European way' (1958b: 9; he credited Hawkes' *Prehistoric foundations of Europe* (1940) with pointing him in this direction (1958b: 7–8; 1958a: 74)).

Europe was of central significance not only because capitalism had reached its highest point of development there, but also because of Childe's awareness of the role of technology in the development of ancient mathematics and science. His early reading of Otto Neugebauer and long association with Benjamin Farrington (Trigger 1980: 95, 109) are reflected in chapter 8 of *Man makes himself*, 'The revolution in human knowledge' (1936). Involvement in Charles Singer's Oxford/ICI team preparing *A history of technology*, whose time-span went right up to AD 1900, would have attracted further attention to the development of modern science and technology in Europe. Childe's intellectual and chronological range (*History* worked through European philosophy from the Graeco-Roman civilizations to the 20th century) placed him a unique position to reflect upon the relationship between prehistory and the more recent past.

Thus *The prehistory of European society* cast its net wide, and abandoned the caution of 1947 about the use of historical analogy. It begins and ends with references to nuclear physics (1958b: 9) and Galileo and Newton (1958b: 173), and invokes the IR twice (1958b: 35, 83). Once again, Childe attached the IR to the NR rather than the UR (1958b: 35):

Were the statistical data available, the European population graph would certainly show at the beginning of the New Stone Age a sharp kink and upward bend comparable to what ensued upon the Industrial Revolution in England. That analogy is my excuse for speaking of a 'Neolithic Revolution'.

In a final flourish (1958b: 172–3) the conditions in the European Bronze Age

foreshadowed the peculiarities of European polity in Antiquity, the Middle Ages, and Modern Times. . . . craftsmen, the exponents of applied science, have preserved their traditional freedom of movement within a supranational economy. The metics at Ath-

ens, the wayfaring journeymen of the Middle Ages, and the migrant craft unionist of the nineteenth century are [their] lineal descendants . . . But so were the Natural Philosophers and Sophists in Classical Greece, the travelling scholars of medieval Europe, and the natural scientists who from the days of Galileo and Newton have freely exchanged information and ideas by publication, correspondence, and visits regardless of political frontiers.

Conclusion

Childe was singled out as a 20th-century scholar who extended the term 'Revolution' back from the IR to the past in J.B. Cohen's historiographical study *Revolutions in science* (1985: 268). This is a well-deserved compliment to a man who was more than usually aware of the place of archaeology in a wider world. Childe's achievement took place *before* the Scientific Revolution had been 'invented' and popularized (*pace* Clark 1977: 41), and well before the naming of numerous other past and present revolutions, political and non-political. Inconsistent use of the characteristics of the IR, and a willingness to switch the analogy from the UR to the NR, does not diminish the metaphorical power of the NR, in which the respective Enlightenment and Romantic preoccupations with Stages/transitions and Ages/revolutions coalesced into a modern form (Sherratt 1989: 59). The NR has played a significant role in many influential works, from the final volume of A.J. Toynbee's *A study of history* (1961: 283, 337) to Michael Mann's *The sources of social power* (1986: 38–9, 44). The NR retains such an appeal to histo-

rians of technology that their perception of the IR may have been influenced by the many secondary works that present Childe's NR as a quasi-historical event, qualitatively different from the nebulous 'transitions' described by most archaeological writers up to the 1920s. Meanwhile Sherratt has done much to reclaim Childe's revolutions from the gradualism of the 1960s (e.g. Clark & Piggott 1965: 148), both by seeing his own Secondary Products Complex as an aspect of the UR (1997b: 497–8), and by placing revolutions back into the context of climatic change (1997c). He was certainly right to conclude that 'Childe had a pioneer's clarity of vision: it is his sense of structure which can still inspire us as we continue to accumulate the detail' (1997b: 504).

Acknowledgements. These ideas arose during my tenure of a Research Fellowship funded by the Leverhulme Trust (1997–98); this wider research into the context of Roman technological change has also been supported by the University of Newcastle upon Tyne's Research Committee and the Society of Antiquaries of London (Hugh Chapman Memorial Fund). The libraries of the Literary & Philosophical Society of Newcastle upon Tyne and the Science and Technology Studies section at Imperial College, London were particularly useful. Andrew Sherratt and Peter Gathercole generously contributed ideas and encouragement; restrictions of space have prevented me from following up more than a handful of their suggestions. My full debt to Bruce Trigger and Barbara McNairn may not be fully apparent from the number of citations of their writings. Finally, as a newcomer to Childean studies, I must cite Ruth Tringham's observation (1983: 90) in defence of my shortcomings: 'Even the most ardent Childe-fan has probably not read more than half of his 22 books or 225 articles'.

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